



Nordiska kommissionen för Geodesi Nordic Geodetic Commission

Working Group for Geodynamics and Earth Observations

Minutes of the 45th meeting of the Working Group for Geodynamics and Earth Observations, within the Nordic Geodetic Commission

The meeting was on Zoom and hosted by the Höskolan in Gävle on 16 March 2021. It was organized together with the meeting for the Working Group of Future Height Systems and Geoid that took place on Zoom hosted by the Höskolan in Gävle on 15 March 2021. National reports for both meetings were (already) given at the WGFHSG meeting.

Participants (72):

Belgium	Pierre-Yves Declercq, Xavier Devleeschouwer, Kevin Gobron, Michel Van Camp
Denmark	Tim Enzlberger Jensen, Kristian Evers, Rene Forsberg, Kristian Keller, Thomas Knudsen, Erik Lysdal, Aslak Meister, May Ritt V. Pedersen, Majbritt Sörensen, Gabriel Strykowski, Hergeir Teitsson
Estonia	Nicole Delpeche-Ellmann, Artu Ellmann, Anti Gruno, Vahidreza Jahanmard, Tarmo Kall, Karin Kollo, Aive Liibusk, Jaanus Metsar, Tõnis Oja, Andres Rüdja, Sander Varbla
Finland	Mirjam Bilker-Koivula, Jaakko Mäkinen, Jyri Näränen, Maaria Nordman, Markku Poutanen, Hannu Ruotsalainen, Veikko Saaranen
Germany	Stefan Friedländer, Lukas Ruesch, Ludwig Schröder, Joachim Schwabe
Iceland	Guðmundur Valsson (Secretary)
Latvia	Armands Celms, Diana Haritonova, Janis Kaminskis, Katerina Morozova, Jānis Sakne, Viesturs Sprogis, Ļubova Šulakova, Madara Znotiņa, Vents Zuševics
Lithuania	Eimuntas Parseliunas
Norway	Kristian Breili, Martina Idzanovic, Halfdan Pascal Kierulf, Eirik Mysen, Ove Christian Dahl Omang, Vegard Ophaug, Matt Simpson, Olav Vestøl
Sweden	Anders Alfredsson, Mohammad Bagherbandi, Mehdi Darvishi, Andreas Engfeldt, Nureldin Gido, Lotti Jivall, Örjan Josefsson, Faramarz Nilfouroushan, Tobias Nilsson, Tong Ning, Per-Anders Olsson, Holger Steffen (Chair), Rebekka Steffen
United Kingdom	Yasser Maghsoudi (Invited), Katarina Vardic, Pippa Whitehouse

1. Introduction

The chair welcomed all participants to the meeting.

The agenda was approved.

The participants of the meeting were invited to comment on the minutes from the previous meeting in Reykjavik, 10 March 2020. There were no comments to the minutes.

Guðmundur Valsson (Iceland) was appointed as secretary. The chair noted again that the secretary duty should be shared among the countries. In the next two years (2022 and 2023) Denmark and Lithuania will nominate a secretary. In 2024, it will be Estonia's turn.

The chair gave a short introduction to the meeting and forwarded input from the NKG presidium. The presidium strongly acknowledged the Science Week in Reykjavik last year and highlighted it as important example of Nordic cooperation. Furthermore, it encourages to follow InSAR developments in all Nordic and Baltic countries.

The meeting's topics were InSAR, GIA, and gravimetry.

2. InSAR

The first presentation was given by the invited speaker Dr. Yasser Maghsoudi from the University of Leeds after an introduction from the chair.

- Yasser Maghsoudi: "The Use of InSAR Technology for Studying Earthquakes and Tectonic Activities"

The main discussion point after the presentation was combination of InSAR and GNSS. There were also discussions about uncertainties, corrections (tropospheric and ionospheric) and seasonal variations. One of the main challenges is how to solve the North-South deformation.

The next five presentation were about status of InSAR work in various countries.

- Per-Anders Olsson et al.: "Swedish GMS Project: Test and Evaluation of a Swedish Ground Motion Service"
- Faramarz Nilfouroushan et al.: "Geodetic SAR Project: Establishment of a Regional Electronic Corner Reflectors Network around the Baltic Sea"
- Lukas Rüsç, Stefan Friedländer, Ludwig Schröder: "Recent Remote Sensing and Geodetic Activities in the Baltic Sea Region at the Federal Agency for Cartography and Geodesy (BKG)"
- Kristian Keller, Erik Lysdal, Aslak Meister & May Ritt Veybøll Pedersen: "Compact Active Transponder (CAT) as an alternative to traditional corner reflectors - preliminary experiences from a test bed in Havnebyen, Denmark"
- Madara Znotiņa et al.: "Electronic Corner Reflectors test phase in Latvia"

The main discussion points after all those presentations were regarding transponders, both active and passive.

There are several issues with the use of the CAT (Compact Active Transponders). Power issues, water in challenging environments and sometimes issues with license for radio transmission. Many countries are designing their own passive transponders. Fruitful discussions addressed the shape, size, position, orientation, and interference of those transponders.

The last two presentations were about use of InSAR in Urban areas:

- Tõnis Oja & Anti Gruno: "Monitoring of ground movements in Tallinn using PS-InSAR analysis"
- Nureldin Gido, Mohammad Bagherbandi, Faramarz Nilfouroushan: "Localized Subsidence Zones in Gävle City Detected by Sentinel-1 PSI and Leveling Data"

Discussion

The participants discussed the status of InSAR within the NKG WGGeo and WGFHSG. The discussion points were the following:

- i. How much NKG coordination is needed for InSAR in the Nordic and Baltic countries?
- ii. Shall WGGeo continue serving as annual forum?
- iii. Should we propose to start of a new NKG study group or NKG project at the next NKG GA?

The participants confirmed a need for cooperation and sharing of knowledge. Markku Poutanen pointed out some similarities with InSAR today and GNSS in the early nineties - an exciting (new) technique that becomes more and more applicable. It is great to follow its implementation. It was concluded that the role of NKG and WGGeo should be providing a discussion forum for InSAR and Geodetic SAR to share experiences, best practices, and thoughts within the community. A continuation of the InSAR session is appreciated. Thus, it was decided that InSAR should be kept on the agenda also for future meetings; an InSAR session will be organized together with the WGFHSG since the meetings are always held together. The session can be hosted by one of working group depending on their overall agenda, but it will either be the last session of the first meeting or the first session of the second meeting.

3. Glacial Isostatic Adjustment

The next session on GIA had two short scientific presentations followed by two discussion items.

- Holger Steffen: "Notes on the quality of global GPS databases before use in regional GIA investigations and on elastic correction"

Holger discussed two global GPS databases that were designed for usage in GIA and sea-level studies. Both are based on the huge dataset available from the University in Reno, Nevada, USA. He could show that there are still significant outliers in the databases, although they were already filtered. Thus, users of these databases must be careful and do some quality assessment before using them.

- Matt Simpson: "Project QUANTSEA"

This is a project that aims to quantify past and future sea level changes in Norway. As part of it, relative sea-level changes of some thousand years back in time are collected or re-evaluated and harmonized. The possibility of 3D GIA modelling was discussed as varying subsurface structures, especially lithospheric thickness variations, are known to occur in Norway.

Discussion

Before discussion the chair gave a short report about the status of the NKG2022GIA activity

- Holger Steffen: "NKG2022GIA activity status March 2021"

The discussions points were (i) coordination of the activity and (ii) its relation to the QUANTSEA project introduced by Matt. Maaria Nordman would like to contribute, but needs to apply for some funds, Vents Zusevics is also interested to take part. It was discussed if Norwegian relative sea-level data will be ready for the NKG2022GIA model development. It was agreed upon that the model results shall be published open accessible. Those involved or with interest in the work will have a dedicated meeting tbd in May.

- Holger Steffen et al.: “BIFROST2020 and NKG202XLU status”

Holger presented an update. All requested German data are in place or can be downloaded. Polish data will be provided. All Nordic and Baltic countries agreed to provide their GNSS data to the project. Colleagues involved had a meeting in January 2021 and discussed parts of the workload. It was decided to await the ITRF2020 before calculations can start. But, data preparation shall commence. Regarding a new land uplift model, the question came up if elastic corrections for current day glacial melting should be a part of the LU model.

4. Gravimetry

The session was much shorter compared to previous years. This might be due to several publications published in the last years that mark the many progresses recently. More measurements may need to be performed to continue with dedicated analyses.

- Mirjam Bilker-Koivula, Jaakko Mäkinen, Hannu Ruotsalainen, Jyri Näränen, Timo Saari: “Latest results of the Finnish absolute gravity time series”

Mirjam showed nicely that trends in AG measurements stabilize after 10-20 years depending on corrections. Andreas Engfeldt encouraged other countries to start a similar work for their AG data.

- Jaakko Mäkinen: “Correction for the polar motion in gravimetry and in positioning: compatibility issues”

The talk slides will not be available until the corresponding paper is published.

Discussion

- Andreas Engfeldt: Nordic AG database update

Data from Estonia have been added, Latvia has delivered data and Finland is about to deliver. Other countries are urged to deliver their data to Andreas (andreas.engfeldt@lm.se).

- Andreas Engfeldt: Nordic AG comparison in Onsala

Andreas was in touch with several international institutions who have expressed interest in participating. The majority favors a time next year. Hence, the AG comparison in Onsala is postponed until 2022, but before the General Assembly. A detailed plan will be presented next year.

- Jaakko Mäkinen: Status of the land uplift gravity lines publications

Progress here was slower than expected because Jaakko had to focus on other work and publications. Large parts of data were already sent to Andreas Engfeldt, however, an additional

analysis & programming by Jaakko is missing. Jaakko promises to do so soon after finishing his study he presented earlier.

5. Business matters

Status of the NKG website: The website is up and running again and is now hosted at the National Land Survey of Iceland. The chair has access to the website and will add material to the WGGE0 section of it.

Mailing list: Members of the working group are urged register to the mailing list of the working group WGGE0 under https://www.freelists.org/list/nkg_wggeo. **The chair will not continue with direct messages to individuals** regarding meeting announcement, agendas and minutes.

6. Closing of the meeting

The chair thanked the participants for the meeting.

Next meeting will be in Gävle, Sweden in week 11 as usual, just cross your fingers.

The chair thanked the Högskolan in Gävle for arranging this Zoom meeting. All participants are looking forward to meeting next time in the real world.